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6473086, A2000-04-9385-097, B2000-02-7710B-057; 20000101.

Title
Use of coded waveforms for **SODAR** systems.

Author(s)
Bradley-S-G.

Author affiliation
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Abstract
Pulse-compression, phase-encoding and **chirp** techniques are frequently used in EM systems to improve system performance. Simple averaging-over-range and averaging-over frequency schemes have been used in some **SODAR** systems, but generally code techniques are problematic because of the high fractional Doppler shift of 0-0.04. The principles of pulse code methods are reviewed with regard to their applicability to **SODAR** systems. In particular, detailed simulations are performed, using weather-like targets, of a comb of frequencies, a **chirp,** and a phase-encoding method. Three Doppler-

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adaptive matched filters are described, and two of these evaluated against the simulated noisy atmosphere. It is found that the comb of frequencies produces the least variance in estimated Doppler wind speed. A filter based on a single evaluation of an FFT for the received signal provides Doppler winds to about 1%. The Doppler-adaptive filters add little computational or hardware overhead, and produce as a simple output a best estimate of the wind speed component. (8 refs).

Descriptors

adaptive-signal-processing; atmospheric-techniques; geophysical-signal-processing; matched-filters; pulse-modulation; remote-sensing; sonar; wind.

Keywords

sonar; **sodar;** atmosphere; remote sensing; acoustics; measurement technique; coded waveform; pulse compression; phase encoding; **chirp;** pulse code method; Doppler adaptive matched filter; comb of frequencies; wind speed; Doppler adaptive filter.

Classification codes

A9385 (Instrumentation and techniques for geophysical, hydrospheric and lower atmosphere research).

A9260G (Winds and their effects in the lower atmosphere).
A9365 (Data and information; acquisition, processing, storage and dissemination in geophysics).
B7710B (Atmospheric, ionospheric and magnetospheric techniques and

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